



U.S. Department of Transportation
Federal Highway Administration

Priority, Market-Ready Technologies and Innovations

Pavement Smoothness Methodologies

Problem: Rough pavements contribute to inefficient roadways

Pavement smoothness is probably the single most important indicator of performance from the standpoint of the traveling public. National surveys of road users list smooth pavements as a top highway characteristic. Rough or uneven pavements adversely affect driver safety, fuel efficiency, ride quality, and vehicle wear-and-tear. Rough pavements also negatively impact pavement durability.

Putting It in Perspective

- In a 2002 Federal Highway Administration (FHWA) survey, road condition was cited as the public's number one criteria for satisfaction.
- A National Cooperative Highway Research Program analysis showed that improved smoothness extends pavement performance life by as much as 50 percent.

Solution: Improve pavement smoothness technologies

Because of the public's focus on smoothness, any improvements made in both the initial and long-term smoothness of a roadway should lead directly to greater customer satisfaction.

Why is pavement smoothness important?

The functionality and performance of smooth pavements is better than that of rough pavements. Furthermore, high levels of initial smoothness have been shown to have a significant effect on the future smoothness of pavements, and also have been linked to increases in pavement life.

Successful Applications: New products help improve the condition of the Nation's highways

American Association of State Highway and Transportation Officials (AASHTO) Provisional Standards

The *Provisional Standards for Pavement Smoothness*, adopted by AASHTO in June 2003, provide a standard set of specifications and protocols to assure owner agencies that test results from inertial profilers are both repeatable and reproducible.

The Provisional Standards include the following components:

- MP11-03 Profiler Equipment Specification.
- PP49-03 Profiler Certification Program.
- PP50-03 Smoothness Measurement Test Methods.
- PP51-03 Pavement Smoothness Specification.

Ongoing research will enhance these provisional standards to full standards within 7 years. Active research conducted under the FHWA research contract, "Smoothness Criteria for Concrete Pavements" will provide answers to questions concerning the appropriate specification limits, the value of enhanced smoothness, and methodologies for identifying localized roughness.

National Highway Institute (NHI) course on pavement smoothness measurement

A training course offered by NHI, "Factors Affecting Inertial Profile Measurements for Construction Quality Control" (NHI 131100) is an integral part of the PP49-03 Profiler Certification Program. This training course highlights the appropriate application of inertial profilers for construction quality control.

*Pavement Profile Viewer and
Analyzer (ProVAL) software*

Advanced profile analysis capabilities, developed to support the Provisional Standards, currently are available as part of the ProVAL software. This software provides advanced profile analysis techniques such as power spectral density and cross correlation. ProVAL software is available at www.roadprofile.com.

Benefits

- Ensuring pavement smoothness during initial construction saves money and improves durability over the life of the pavement.
- Pavement smoothness enhances the safety and mobility of the Nation's highways.



Lightweight profiler

Additional Resources

After an agency has implemented an improved pavement smoothness specification based on inertial profilers, methods for achieving these specifications must be provided to contractors. Best practice guides for pavement smoothness for both asphalt and concrete pavements are available from the FHWA Office of Pavement Technology. These guides provide concise information about measuring, expressing, specifying, and achieving pavement smoothness.

For more information, contact:

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